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## Acute Poliomyelitis in Europeans Admitted to the Walker Wilkins Infectious Diseases Hospital, Salisbury

BY

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Attached is a graph of the incidence of European cases of acute poliomyelitis and allied conditions sufficiently ill to be admitted to the Wilkins Infectious Diseases Hospital, Salisbury, S. Rhodesia, during the year 1st July, 1956, to 30th June, 1957.

The following are some of the clinical features observed during this particular incidence.

1. As noted before in previous outbreaks in this part of S. Rhodesia, the causative agent appears to be restricted to one virus only in any one outbreak—in this case No. 1 (Brunhilde).

2. The age groups again involved the adolescent and young adult in a fairly large percentage of the total, and it is this group that appears to be at greatest risk re the life-endangering form of the infection, especially in the male.

3. The death rate is considerably lower, although the proportion of serious and life-endangering cases remains relatively as high as in previous outbreaks.

4. The residual crippling paralysis is relatively higher in this outbreak. It is possible that some of these cases might otherwise have been included among the mortalities.

5. One striking feature, remarked on previously,<sup>1</sup> is that in all the initially bulbar types of infection and in all the deaths (bar one with encephalitis), the tonsils had been *enucleated*. The fact that this had been done many years

previous to this illness appeared to make no difference.

6. Another striking feature appeared to be that the bulbar case *per se* (i.e., not the ascending Landry type of spino-bulbar paralysis) was sudden in its onset and rapid in its progress. This, occurring at the primary illness or beginning of what is normally the systemic stage, suggests that the invasion of the midbrain might be by the direct route, i.e., via throat and offshoots of ninth and tenth nerves, unprotected by tonsillar adenoid tissue where total enucleation of this has been performed. Whereas in the other types the invasion route takes more time to arrive at the major illness stage, i.e., throat, intestinal tract, blood stream and then invasion of cord and brain from a generalised viraemia.

This supposition must be treated with extreme caution until sufficient evidence is forthcoming to support it. One can quote one outstanding case which might be a pointer in this direction. Two children in one family, a boy aged eleven years and his sister aged nine years, went down with an influenza-like attack. The doctor treated it as influenza. On the second day he saw them and found their temperatures rather high. Later that forenoon the boy started to have difficulty in breathing and in swallowing, and vomited some liquid he had been given. It was in a rural district, and before the doctor could be recalled he died—no doubt due to anoxia.

The little girl was brought to hospital and kept under close observation, rest, etc., and no major illness occurred. She was sent home on the twenty-second day. The boy's body was brought to hospital at the same time as the girl and an autopsy confirmed the condition of the midbrain—oedema and small haemorrhages. There was no oedema or collapse of lung tissue. In this case the boy had had his tonsils

Table I

SHOWING THE TOTAL NUMBER OF CASES OF ACUTE POLIOMYELITIS WITH THE AGE-GROUPS  
AND SEX DISTRIBUTION

Age Group	Male	Female	Total	Deaths
1—6	24+	11	35	+
7—14	17++	6	23	++
15—25	11	7	18	
26—35	8+	9+	17	++
35 and over	2	—	2	
	62	33	95	5

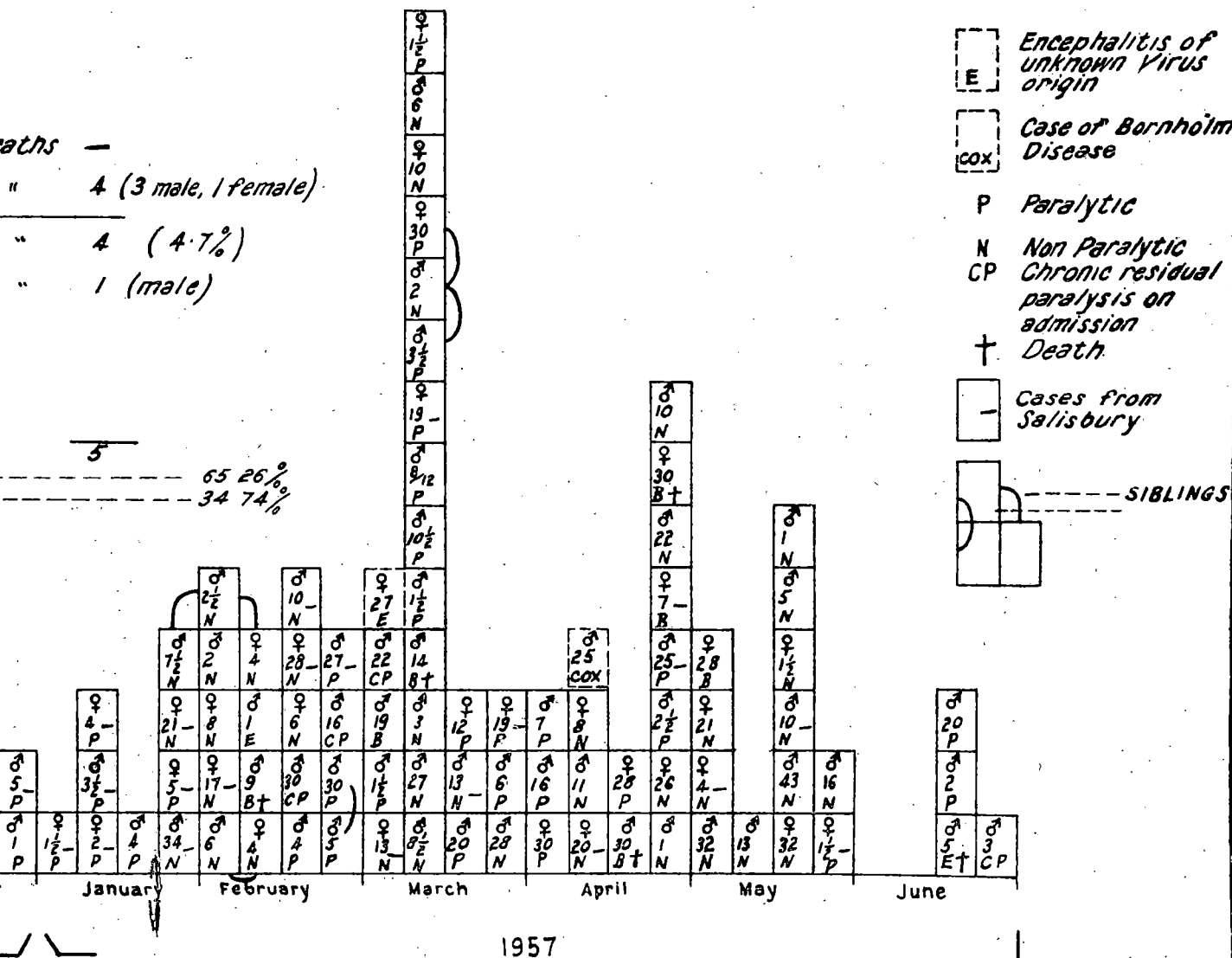
d in the  
ESIA

aths —  
" 4 (3 male, 1 female)  
" 4 (4.7%)  
" 1 (male)

5  
----- 65 26%  
34 74%

LEGEND

- ♂ 1/2 Male sex  
Age  
One case Polio
- [E] Encephalitis of  
unknown Virus  
origin
- [cox] Case of Bornholm  
Disease
- P Paralytic
- N Non Paralytic
- CP Chronic residual  
paralysis on  
admission
- † Death
- [ ] Cases from  
Salisbury
- [ ] SIBLINGS



Cases of Acute Poliomyelitis and allied conditions, hospitalised in the  
WILKINS INFECTIOUS DISEASES HOSPITAL, SALISBURY, S. RHODESIA  
in the year 1st July 1956 - 30th June 1957.

## Summary

### *Acute Poliomyelitis*

*Non Paralytic.*

*Paralytic.*

(Including 7 Bulbar cases and of these, three deaths)

44: Deaths —

41. " 4 (3 male, 1 female)

85. " 4 (4.7%)

5. " 1 (male)

*Acute Encephalitis of unknown virus  
(probably Polio virus)*

*Post Acute Paralytic cases.*

4.

*Bornholm Disease. (Copsackie virus B II)*

1

**Total :- Polio and allied conditions.**

95

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3

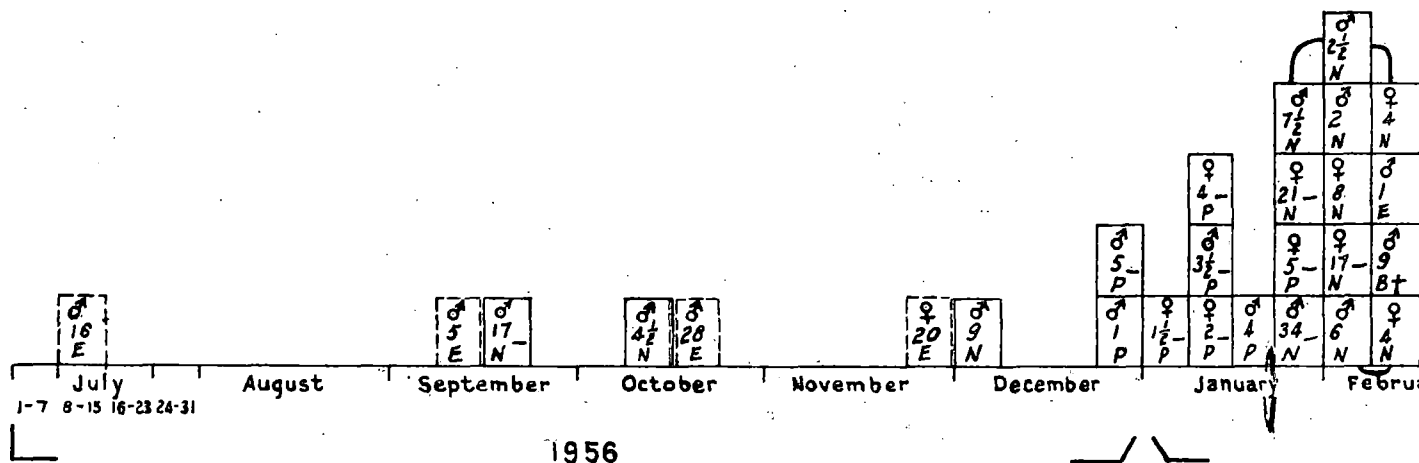
	Males	Females
Urban cases (Salisbury)	24	24
Rural cases	71	33

*Males* 62

<i>Females</i>	33
----------------	----

65 26/

34 74



*enucleated* (some years previously) and he died within 48 hours or so of the commencement of the "minor" illness. The sister whose tonsils were intact was put to rest at once and exhibited only the minor illness.

The following types were observed:

*Nonparalytic Poliomyelitis* (mainly systemic involvement).

(1) *Abortive*.—This occurs as the minor illness only and may be so slight that the victim does not complain, viz., symptoms may be any one or more of the following: slight fatigue, fleeting headache, nausea, ache in lumbar region, 'flu-like ache in limbs, soreness of throat, diarrhoea or even vomit. The patient may relate this to some event such as a late night, cocktail party, etc., the previous day or two or put it down to a chill or a gastric upset, and may or may not spend a day in bed and then get up and carry on. If this patient does anything strenuous in the next few days, or if the infection is fairly virulent and invasion massive, any of the following types may ensue.

(2) *Acute Hyperpyrexial*.—This is the phase which follows a minor illness, although it is difficult in some cases to obtain a clear history of a minor illness. It is assumed that the virus has now moved from the throat to the digestive system and from there over to the blood stream. The pyrexia is due to a viraemia and involvement of the spinal region of the central nervous system. The symptoms are more or less a severe reproduction of those of the minor illness: intense headache, some stiffness in neck and back, with pain on flexion. There is a tripod stance in sitting up and positive Kernig. General aches and pains, constipation, difficulty in micturition, anorexia and high temperature are other features. A lumbar puncture gives a clear fluid under some pressure. The cell count can vary from 10 to several hundreds, most of the cells being monocytes. Protein is usually raised and the Nonne Apelt reaction positive. The symptoms subside in a few days and, apart from a tendency to constipation, which may last for many months or longer, the patient on discharge from hospital is symptomless. The virus can be recovered from the stool for several weeks or even months. The quarantine period is 21-28 days. *Acute Paralytic Poliomyelitis* (neurological involvement).

(1) *Spinal*.—(a) Symptoms as in the simple acute hyperpyrexial type with paralysis of limbs and possibly bladder. This is common with children and is just like the old type of infantile

paralysis. The course is normally straightforward, although there is frequently a major or minor degree of residual paralysis affecting one or more limbs, with a preference for the lower limbs.

(b) Limbs as well as respiratory muscles partially affected, i.e., intercostals and/or diaphragm, plus or minus paralysis of the bladder. The course is not easy and is fraught with hazards, especially if there is stubborn intestinal stasis and if the tank respirator has to be used for more than a few days.

There may be—

- (1) tacky mucus;
- (2) excess of mucus;
- (3) dilatation of stomach;
- (4) paralytic ileus;
- (5) greatly lowered vital capacity, which may last for years or may be permanent, possibly aggravated by hyperventilation;
- (6) permanent residual paralysis.

(c) Respiratory failure, with sudden onset, with perhaps some paralysis of the limbs or bladder. So long as the patient is "dry" and not secreting much mucus in the retropharynx, this type is ideal for the tank respirator, and the earlier this is done the better. If the case has to travel from any distance, the hazard becomes very great and the patient is frequently received at the hospital in a cyanosed condition. Endotracheal intubation and hand operated positive pressure are most effective for the journey. Recovery may be complete, but there is usually some residual weakness of limb or limbs and possibly a permanently lowered vital capacity.

(2) *Bulbo-Spinal*.—(a) This includes the spinal varieties with involvement of cranial nerves. This may be a facial paralysis or one-sided palatal paralysis, with nasal speech and regurgitation of food particles down the nose. When the intercostals and/or the diaphragm are affected and recourse is had to the tank respirator, one has to be extremely careful over the formation of excess mucus in the retro-pharynx. If this occurs, *early* tracheotomy is the only answer.

(b) *The Ascending Spino-Bulbar Type*, viz., paralysis of limbs, bladder, shoulder girdle (unable to shrug shoulders adequately), with perhaps involvement of the respiratory muscles, palate and the muscles of deglutition. There are also all the other concomitant symptoms, such as hyperpyrexia, intense headache, alert-



ness with apprehension at first, and later drowsiness, Cheyne Stokes breathing and ultimately death. There may be terminal coma or the patient may be alert up to the last few minutes; in the former case the common cause is hypoxia and oedema of the brain; in the latter a sudden failure of the cardio-vascular system, with the collapse of the peripheral circulation which is dramatic in its suddenness. This type, of the Landry variety, is probably the one which contributed to most of the deaths in the past. The patient would have survived the spinal involvement, but the pyrexia would persist or suddenly rise, and as the midbrain became involved the patient would succumb within the next two to four days.

In the above types (a) and (b) there is often a history of strenuous exercise preceding the attack, such as long hours on a tractor on the farm, a game of rugby, a gymkhana, etc.

(3) *Direct Bulbar*.—The term "direct" is used here because from close observation it is noted that the majority of these cases present a sudden onset with little or no preliminary symptoms or minor illness; only a slight influenza-like malaise for one or two days and hyperpyrexia from the start. Also at first there is no involvement of limbs.

Where we are dealing, to start with, with failure of deglutition only (ninth cranial) and there has been no vomiting or impairment of respiration and the patient has been put into the prone position and preferably semi-postural for drainage of buccal pharyngeal secretions, the prognosis need not be very bad from a life-endangering point of view. Unfortunately many of these cases later—i.e., after the immediate bulbar crisis—develop paralysis of limbs and remain seriously crippled for life.

Constant care, suction, cooling measures, sedation and restriction of all oral ingestion in the early stages will often give good results.

Where there is a commencing failure of respiration (probably vague in origin with hyperpyrexia, with some anoxia, excess secretion of mucus in the pharyngo-tracheal tract, and more so if there has been vomiting with aspiration of vomit, along with an impaired or absent cough reflex, with a rapidly sinking vital capacity and a rising blood pressure, the prognosis is grave indeed. The tank respirator would be a lethal weapon in such a case unless immediate intubation with a cuffed endotracheal tube has been established; this would then give time to

arrange for and decide upon the usual follow-up, viz., a tracheotomy, with cuffed tube and positive negative pressure respiration.

Where tracheotomy is indicated it must not be delayed. If the anoxia has advanced beyond a certain stage, or there is atelectasis or commencing oedema of the lung, or the virus involvement of the medullary centres is massive, the resulting death would naturally bring the operation of tracheotomy into unjust disfavour. On the other hand, the risks of tracheotomy are negligible if the patient is not yet exhausted. Antibiotics can take care of any risks of infection and the added facilities for the aspiration of mucus, for the clearing up of an alectasis and the early establishment of adequate pulmonary ventilation can be life-saving.

One outstanding feature is that in all these cases encountered in Salisbury the tonsils had been removed "by enucleation." The time factor was quite irrelevant; a few had had a tonsillectomy performed a few months previously, but others had had this operation in childhood up to 25 years previously.

It is suggested that in the general treatment of the more serious cases of poliomyelitis the following might be worthy of consideration. Dr. Ritchie Russel (1956) and others have pointed out how the virus proliferates actively in the nerve cells when the metabolism is stepped up and how this ceases and the virus dies with the arrest of the metabolism. In order to reduce the metabolic function to a minimum, and until other measures are discovered to arrest this proliferation, it is suggested that the following procedures in order of urgency be adopted:

Hyperpyrexia is best combated by cold sponging, aeration of the body surfaces to secure evaporation, and the old-fashioned ice bag to the head.

Adequate sedation is necessary to control wasteful muscular activity and mental activity provided there is no hypoxia. No food is given orally; only fluids are administered by drip, gastric, subcutaneous or the intravenous route. Enemata (milk and glycerine) help to empty the bowel. If there is dilatation of the stomach or bloody vomit, continuous gastric suction is instituted. Slight dehydration is probably beneficial in the early stages for up to 24 hours or less. When a subcutaneous or I.V. drip has to be set up, Darrows solution, or a mixture of invert sugar 10 per cent., potassium chloride 0.3 per cent. in water or in 0.45 per cent. Na. Cl., for preference, should be used because of

its higher potassium and lower sodium contents, but this would depend on the electrolyte balance tests. A daily check of the blood serum in serious cases will give ample warning on albumin loss or inversion of the albumin globulin ratio and the necessity to give plasma.

The suggestion is tentatively put forward that hypothermia, as practised for some surgical operations, might be the answer in the acute (or direct) bulbar type of case if this could be maintained for two to four days, when the virus by that time might have lost its lethal power.

## REFERENCES

1. MELVIN, J. (1955). *Lancet*, 2, 773.
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